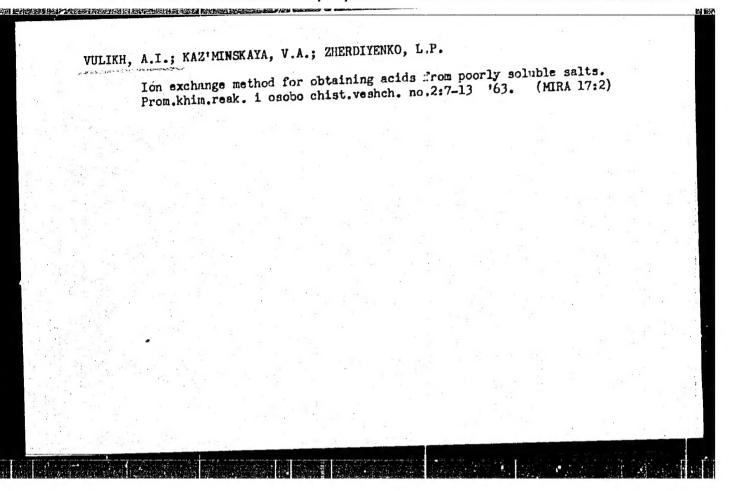S/019/60/000/010/007/057
A151/A029

AUTHORS: Vulikh, A.I., Senyavin, M.M., Karoli, Yu.B., Korotkevich, B.I.,
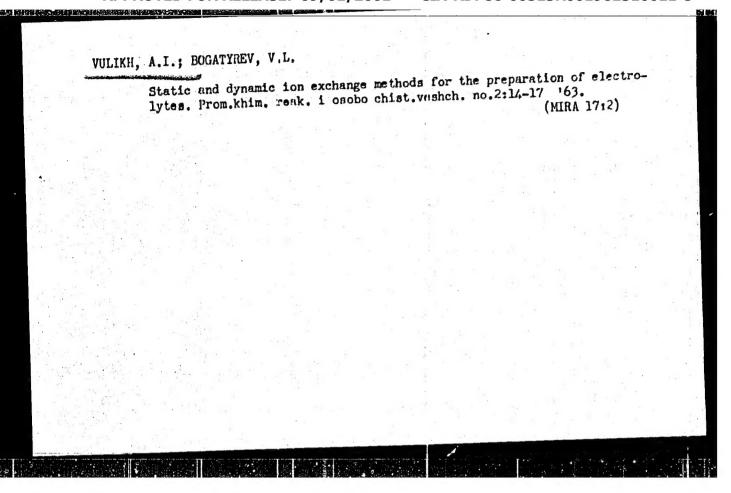   Sidorova, L.G., and Galkina, N.K.

TITLE: A Method for Obtaining Rubidium or Cesium Carbonates

PERIODICAL: Byulleten' izobreteniy, 1960, Nr 10, p 19
             Class 12 1, 16. Nr 128454 (622176/23 of Apr 21, 59).

TEXT: A method for obtaining rubidium or cesium carbonates from their
dissolved salts, by a process of double ion-exchange. It has the following
special features: to increase the degree of metal extraction, ammonium
carbonate is used as the second reagent, whereupon the solution of
rubidium (or cesium) carbonate and of ammonium carbonate is separated by
distillation, while the solution or a salt separated therefrom is being
heated.

Card 1/1

VULIKH, A.I.; KAZ'MINSKAYA, V.A.; ZHERDIYENKO, L.P.

Ion exchange method for obtaining acids from poorly soluble salts.
Prom.khim.reak. i osobo chist.veshch. no.2:7-13 '63. (MIRA 17:2)

VULIKH, A.I.; BOGATYREV, V.L.

Static and dynamic ion exchange methods for the preparation of electro-
lytes. Prom.khim. reak. i osobo chist.vushch. no.2:14-17 '63.
(MIRA 17:2)

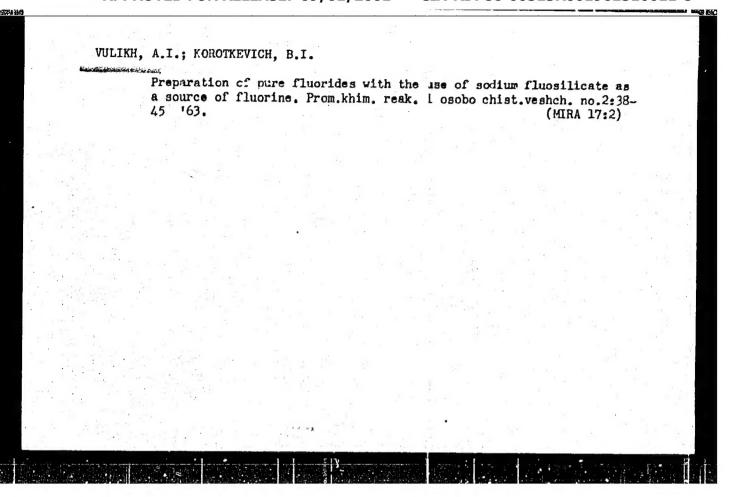VULIKH, A.I.; STATSENKO, A.A.; MAKOVETSKIY, M.I.; MIL'SKIY, S.A.

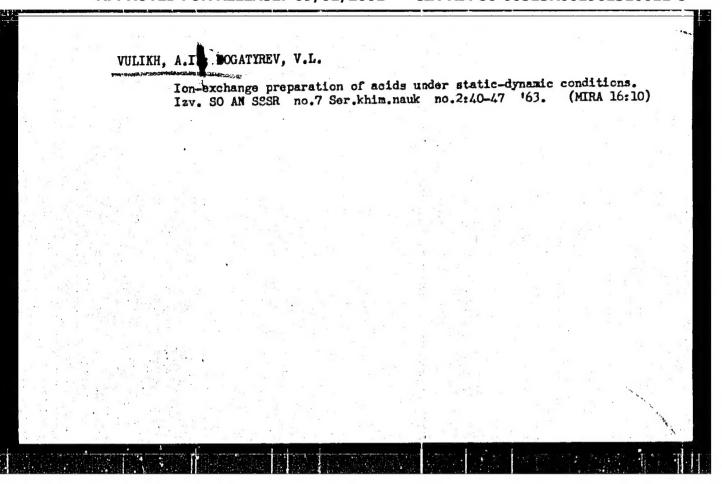Chemical method for the preparation of welding fluxes. Prom.khim. reak.
i osobo chist.veshch. no.2:18-22 '63.   (MIRA 17:2)

L 12660-65   EWG( )/EWT(m)/EPF(c)/EPF(n)-2/EPR/EWP(b)   Pr-4/Pa-4/Pa-4
ASD(d)/AS(mp)-2/ASD(m)-3/AEDC(b)   JD/JG/MLK

ACCESSION NR: AT4046116   S/0000/63/000/002/0023/0026

AUTHOR: Vulikh, A. I.; L. D. Prikhod'ko; M. I. Makovetskiy

TITLE: Preparation of anhydrous lithium hydroxide and oxide from lithium hydroxide monohydrate

SOURCE: USSR. Gosudarstvennyy komitet khimicheskoy i neftyanoy promy*shlennosti. Promy*shlennost' khimicheskikh reaktivov i osobo chisty*kh veshchestv (Industry of chemical reagents and extra pure substances); informatsionnyy byulleten', no. 2. Moscow, IREA, 1963, 23 26

TOPIC TAGS: lithium hydroxide, lithium oxide, anhydrous lithium hydroxide, anhydrous lithium oxide, thermal decomposition, vacuum melting, vacuum dehydration, corundum crucible

ABSTRACT: The thermal decomposition of lithium carbonate and lithium hydroxide monohydrate in a vacuum was investigated on a large scale, and the conditions for obtaining anhydrous lithium hydroxide and lithium oxide from the monohydrate were established. Among all the crucible materials tested, corundum was found to be the best for this purpose. A horizontal vacuum electric furnace with a steel retort and Silit heaters was used, with a VN-2 oil vacuum pump. The process was

Card   1/2

L 12660-65
ACCESSION NR: AT4046116

carried out in two stages: first, the water of hydration was removed by heating at 300-350C in vacuo (600-650 mm Hg) and the anhydrous hydroxide was obtained, which is a porous product with a structure similar to that of the initial mono-hydrate. In the second stage, the complete dissociation of lithium hydroxide is obtained at a gradually increasing temperature (up to 900-1000C) and a gradually decreasing pressure (down to 1 mm Hg). The resulting lithium oxide is a solid cake, which separates readily from the corundum crucible. The weight is only 1-2% lower than the theoretical yield. No traces of the product could be detected out-side the crucible. Thus, by removing most of the water from LiOH at a temperature lower than 900C, when the vapor pressure of LiOH is still low, loss of lithium ox-ide can be avoided. Chemical analysis showed that the reaction product contained 98-99% Li_2O, less than 0.1% Al, and less than 1% Li_2CO_3 (the initial lithium hydroxide contained 0.5% CO_2).

ASSOCIATION: None

SUBMITTED: 27Nov63   ENCL: 00   SUB CODE: IC, GC

NO REF SOV: 003   OTHER: 012

Card 2/2

VULIKH, A.I.; KOROTKEVICH, B.I.

Preparation of pure fluorides with the use of sodium fluosilicate as a source of fluorine. Prom.khim. reak. i osobo chist.veshch. no.2:38-45 '63.   (MIRA 17:2)

VULIKH, A.I. BOGATYREV, V.L.

Ion-exchange preparation of acids under static-dynamic conditions.
Izv. SO AN SSSR no.7 Ser.khim.nauk no.2:40-47 '63.   (MIRA 16:10)

MIKULINSKIY, A.S.; KOZHEVNIKOV, G.N.; BAKHIREVA, L.D.; VULIKH, A.I.

Vacuum-thermal separation of cesium and potassium fluorides. Izv.
SO AN SSSR no.7 Ser.khim.nauk no.2:105-107 '63.   (MIRA 16:10)

1. Ural'skiy filial AN SSSR, Sverdlovsk.

BOGATYREV, V.L.; VULIKH, A.I.

Ion exchange preparation of acids. Izv. SO AN SSSR no.11 Ser.khim. nauk no.3:70-72 '63.   (MIRA 17:3)

VULIKH, A.I., kand.tekhn.nauk; STATSENKO, A.A., inzh.; MAKOVETSKIY, M.I.,
   inzh.; MIL'SKIY, S.A., inzh.

New technology for the production of fluxes for soldering and
welding. Svar. proizv. no.9:24-26 S '63.   (MIRA 16:10)
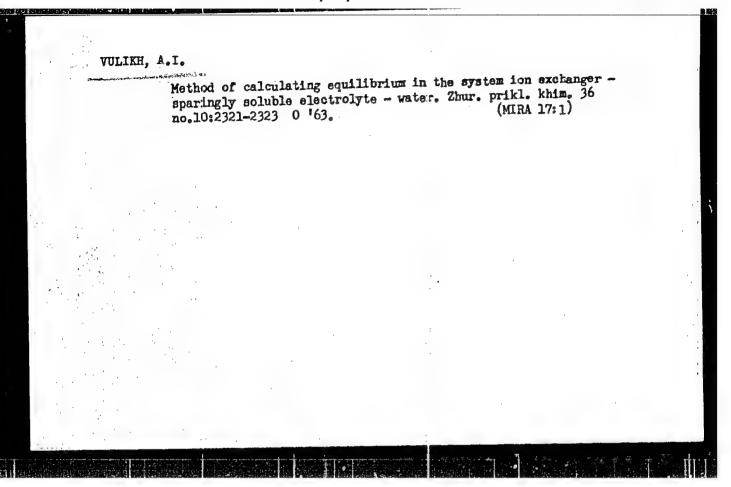
1. Novosibirskiy zavod khimicheskikh reaktivov.

USSR

ACCESSION NR: AP4004065   S/0286/63/000/020/0012/0012

AUTHOR: Kutolin, S. A.; Vulikh, A. I.

TITLE: Preparative method for alkali metal titanates. Class 12,
No. 157967

SOURCE: Byul. izobret. i tovarn. znakov, no. 20, 1963, 12

TOPIC TAGS: titanates, titanate synthesis, alkali metal titanates,
titanium oxides, titanium dioxide, alkali metal hydroxide

ABSTRACT: An Author Certificate has been issued for a method of pre-
paring alkali metal titanates by fusing alkali metal hydroxides with
titanium dioxide at 1 mm Hg.

ASSOCIATION: none

SUBMITTED: 21Nov62   DATE ACQ: 13Dec63   ENCL: 00

SUB CODE: CH   NO REF SOV: 000   OTHER: 000

Card 1/1

VULIKH, A.I. (Novosibirsk); KAZ'MINSKAYA, V.A. (Novosibirsk); ZHERDIYENKO, L.P.
(Novosibirsk)

Chemical experiments with the use of ion exchangers. Khim. v shkole
18 no.5:57-65 S-O '63.   (MIRA 17:1)

BOGATYREV, V.L.; VULIKH, A.I.

Ion exchange preparation of bromic and iodic acids. Zhur.prikl.khim.
36 no.1:220-222 Ja '63.   (MIRA 16:5)
         (Bromic acid) (Iodic acid) (Ion exchange)

VULIKH, A.I.

Method of calculating equilibrium in the system ion exchanger –
sparingly soluble electrolyte – water. Zhur. prikl. khim. 36
no.10:2321-2323 O '63.   (MIRA 17:1)

NIKOLAYEV, A.V.; BOGATYREV, V.L.; VULIKH, A.I.

Study of ion exchange processes by means of physicochemical analysis.
Dokl. AN SSSR   153   no.2:360-362   N '63.   (MIRA 16:12)

1. Institut neorganicheskoy khimii Sibirskogo otdeleniya AN SSSR.
2. Chlen-korrospondent AN SSSR (for Nikolayev).

ACCESSION NR: AP4046449   S/0076/64/009/010/2359/2361

AUTHOR: Kutolin, S. A.; Druz', N. A.; Vulikh, A. I. $\mathcal{B}$

TITLE: Second stable modification of lithium metazirconate

SOURCE: Zhurnal neorganicheskiy khimii, v. 9, no. 10, 1964, 2359-2361

TOPIC TAGS: lithium metazirconate, stable modification, x-ray analysis

ABSTRACT: The existence of a second stable modification of lithium metazirco-
nate in the $Li_2O \cdot ZrO_2$ system was established. Heating of $2LiOH \cdot ZrO_2$ in a
muffle furnace for 4 hours at 950C gave a product Li_2ZrO_3 (II) which differed
from that Li_2ZrO_3(I) synthesized by A. A. Grizik and V. Ye. Plyushchev (Zh.
neorg. khimii, 6, 2249 (1961)) from $Li_2CO_3 + ZrO_2$ by heating at 1100C for 1-2
hours. Differences in the two modifications were established from x-ray data.
No mutual transitions of the two modifications were noted. Differences in their
physical properties were established; fusion temperatures--Li_2ZrO_3I, 1800 ±
50C and Li_2ZrO_3II, 1530 ± 50C; densities--4.125 and 3.508, respectively. The

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ACCESSION NR: AP4046449

refractive index of both materials was above 1.70. An examination of the hydrolysis kinetics showed Li_2ZrO_3II hydrolyzed much more readily than Li_2ZrO_3I. Orig. art. has: 2 figures and 1 table.

ASSOCIATION: None

SUBMITTED: 02Jul63   ENCL: 00

SUB CODE: GC   NO REF SOV: 003   OTHER: 006

Card 2/2

NIKOLAYEV, A.V.; BOGATYREV, V.L.; VULIKH, A.I.

Ion-exchange system R^+, NH_4^+ ‖ R^-, Cl^-–H_2O. Zhur. neorg. khim.
9 no.10:2469-2474 O '64.

(MIRA 17:12)

1. Institut neorganicheskoy khimii Sibirskogo otdeleniya AN SSSR.

L 24785-65   EWT(m)/EWP(t)/EWP(b)   IJP(c)   JD/JG
ACCESSION NR: AP5002192   S/0080/64/037/012/2748/2748

AUTHOR: Kutolin, S. A. ; Vulikh, A. I.

TITLE: Synthesis of alkali metal metatitanates under vacuum

SOURCE: Zhurnal prikladnoy khimii, v. 37, no. 12, 1964, 2748

TOPIC TAGS: alkali metal metatitanate, synthesis, lithium metatitanate, potas-
sium metatitanate

ABSTRACT: A method was worked out for the synthesis of alkali metal titanates
by sintering their hydroxides with TiO_2 under vacuum. TiO_2, "special grade",
was well mixed with a stoichiometric amount (Me_2O:TiO_2 = 1) of $LiOH$ or KOH
and placed in a vacuum furnace with a horizontal retort. The temperature was
brought to 650 or 800C for the Li or K, respectively, and held for 1 hour at at-
mospheric pressure. The pressure was then reduced to 0.5-1 mm Hg and the
temperatures were maintained for 2 more hours. The fusion temperature of the
product Li_2TiO_3 was 1325 ± 50C and of K_2TiO_3, 820 ± 10C. Orig. art. has: no

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L 23465-65
ACCESSION NR: AP5002192

graphics

ASSOCIATION: None

SUBMITTED: 26Apr63   ENCL: 00   SUB CODE: GC

NR REF SOV: 0/3   OTHER: 006

Card2/2

NIKOLAYEV, A.V.; BOGATYREV, V.L.; VULIKH, A.I.

Ion exchange system $H^{\bullet}$, Ca'', $|| R'$, $Cl' H_2O$ investigated by the ray method. Dokl. AN SSSR 155 no. 3:607-610 Mr '64.
(MIRA 17:5)

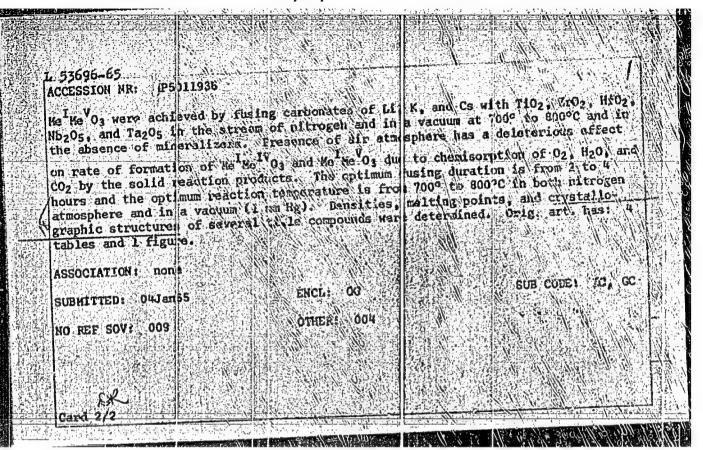1. Institut neorganicheskoy khimii Sibirskogo otdeleniya AN SSSR. 2. Chlen-korrespondent AN SSSR (for Nikolayev).

L 35064-65   EWT(m)/EWP(t)/EWP(E)   IJP(c)   JD/JG   8/0286/65/000/006/0019/0019

ACCESSION NR: AP5008518

AUTHOR: Vulikh, A. L.; Arkhipov, S. M.; Sidorova, L. G.

TITLE: A method for producing bromides and iodides of rubidium and cesium. Class 12, No. 169084

SOURCE: Byulleten' izobreteniy i tovarnykh znakov, no. 6, 1965, 19

TOPIC TAGS: reducing agent, cesium inorganic compound, rubidium compound, bromide, iodide

ABSTRACT: This Author's Certificate introduces a method for producing bromides and iodides of rubidium and cesium by interaction of the higher hydroxides of the bi-carbonates or carbonates of these metals with bromine or iodine in the presence of reducing agents which produce only gaseous products during oxidation. The use of hydrazine hydrate as the reducing agent improves the purity of the product.

ASSOCIATION: none

SUBMITTED: 11May64   ENCL: 00   SUB CODE: GC, IC

NO REF SOV: 000   OTHER:000

Card 1/1

KUTOLIN, S.A.: ZOLIUH, A.I.

Synthesis of alkali metal manganites by vacuum sintering.
Izv. AN SSSR. Neorg. mat. 1 no.2:236-239 F '65.
(MIRA 18.7)

L 53696-65   EWT(m)/EPF(n)-2/T/EWP(t)/EWP(b)/EWA(c)   Pu-4   IJP(c)   JD/HW/JG
ACCESSION NR: AP5011936

UR/0363/65/001/003/0388/0391
666.3:542.9

AUTHOR: Kutolin, S. A.; Vulikh, A. I.; Sergeyeva, A. Ye.

TITLE: Effect of atmospheres of various gases on the thermal synthesis and the properties of $Me_2 Me^{IV} O_3$ and $Me Me^V O_3$ type compounds

SOURCE: AN SSSR. Izvestiya. Neorganicheskiye materialy, v. 1, no. 3, 1965, 388-391

TOPIC TAGS: thermal synthesis, mixed oxide, alkali metal, titanium, zirconium, hafnium, niobium, tantalum

ABSTRACT: Thermal synthesis of anhydrous compounds $Me_2^I Me^{IV} O_3$ and $Me^I Me^V O_3$ (where Me^I is an alkali metal; Me^{IV} is Ti^{4+}, Zr^{4+}, Hf^{4+}; and Me^V is Nb^{5+}, Ta^{5+}) was studied in air and nitrogen atmospheres and in a vacuum. Preparation of these types of compounds is of interest to the nuclear power and electrical ceramic industries. The title compounds were prepared by fusing mixtures of alkali metal carbonates with oxides of the transition elements in the temperature range from 500°C to 900°C. Fusing duration varied from 1 to 8 hours. Quantitative formations of $Me^I Me^{IV} O_3$ and

Card 1/2

L 53696-65
ACCESSION NR: IP5011936

$Me^I Me^V O_3$ were achieved by fusing carbonates of Li, K, and Cs with TiO_2, ZrO_2, HfO_2, Nb_2O_5, and Ta_2O_5 in the stream of nitrogen and in a vacuum at 700° to 800°C and in the absence of mineralizers. Presence of air atmosphere has a deleterious affect on rate of formation of $Me^I Me^{IV} O_3$ and $Me^I Me^V O_3$ due to chemisorption of O_2, H_2O, and CO_2 by the solid reaction products. The optimum fusing duration is from 2 to 4 hours and the optimum reaction temperature is from 700° to 800°C in both nitrogen atmosphere and in a vacuum (1 mm Hg). Densities, melting points, and crystallographic structures of several title compounds were determined. Orig. art. has: 4 tables and 1 figure.

ASSOCIATION: none

SUBMITTED: 04Jan65   ENCL: 00   SUB CODE: IC, GC

NO REF SOV: 009   OTHER: 004

Card 2/2

L 34503-65   EWT(m)/EWP(t)/EWP(b)   IJP(c)   JD/JG
S/0078/65/010/001/0140/0144

ACCESSION NR: AP5002802

AUTHOR: Kutolin, S. A. ;Vulikh, A. I.

TITLE: Synthesis of alkali metal metatitanates in vacuum

SOURCE: Zhurnal neorganicheskoy khimii, v. 10, no. 1, 1965, 140-144

TOPIC TAGS: alkali metal metatitanate, synthesis, structure, density, fusion temperature, hydrolysis

ABSTRACT: The reaction of LiOH, KOH and Li_2CO_3 with TiO_2 at atmospheric pressure and under 1 mm Hg vacuum at 650-950 C for 2-4 hours to synthesize the alkali metal metatitanates was investigated. Li_2TiO_3 and K_2TiO_3 were produced quantitatively by low temperature (650 and 800 C, respectively) reaction under vacuum. Higher temperatures resulted in colored products and corrosion of the corundum and porcelain crucibles. There was no reaction between the carbonate and TiO_2 in air: under vacuum the reaction was essentially the same as with the hydroxide. X-rays showed the structure of the Li_2TiO_3 was ordered. The densi-

Card 1/2

L 34503-65
ACCESSION NR: AP5002802

ty and the fusion temperatures of Li_2TiO_3 and K_2TiO_3 were determined. Both compounds were stable to 800C. Both hydrolyzed in water, the K_2TiO_3 decomposing somewhat more readily than Li_2TiO_3. Orig. art. has: 2 tables and 1 figure.

ASSOCIATION: None

SUBMITTED: 24Jul63   ENCL: 00   SUB CODE: GC, IC

NR REF SOV: 005   OTHER: 016

Card 2/2

L 63568-65   EPA(s)-2/EWT(m)/EPF(c)/EPF(n)-2/T/EWP(t)/EWP(b)/EWA(m)   Pr-4/
Pt-7/Pu-4   IJP(c)   JD/JG

ACCESSION NR: AP5012973   SR/0078/65/010/005/1225/1228
                                                           541.123.62:546.135

AUTHOR: Kirgintsev, A. N.; Kashina, N. I.; Vulikh, A. I.; Korotkevich, B. I.

TITLE: Ternary aqueous systems consisting of potassium, rubidium and cesium
chlorates at 25°C

SOURCE: Zhurnal neorganicheskoy khimii, v. 10, no. 5, 1965, 1225-1228

TOPIC TAGS: potassium chlorate, rubidium chlorate, cesium chlorate

ABSTRACT: The solubility of $KClO_3-CsClO_3-H_2O$, $KClO_3-RbClO_3-H_2O$, and $RbClO_3-CsClO_3-H_2O$ ternary systems at 25°C is studied (see fig. 1 of the Enclosure). The selec-
tion of a feasible method for analyzing potassium, cesium and rubidium systems is
discussed. The method of isothermal desupersaturation was used to study the solu-
bility. In the first system, no solid solutions were formed between potassium chlo-
rate and cesium chlorate, and only the liquid phase was analyzed. In the second
system, both the solid and liquid phases were analyzed; no solid solutions were
formed between potassium chlorate and rubidium chlorate. In the third system, the
solid and liquid phases were also analyzed; rubidium chlorate and cesium chlorate

Card 1/4

L 63568-65

ACCESSION NR: AP5012973

form a continuous series of solid solutions. The authors calculated the activity coefficients for $RbClO_3$-$CsClO_3$ solid solutions, using P. Schmeling's formula

$$\lg \gamma_1 = -\int_0^{x_1} x_2 \, d \lg D_{11}; \quad \int \lg \gamma_2 = -\int_0^{x_2} x_1 \, d \lg D_{21}.$$

where $D_{11} = \dfrac{x_2}{y_2} \cdot \dfrac{y_1}{x_1}$; $D_{21} = \dfrac{x_1}{y_1} \cdot \dfrac{y_2}{x_2}$.

The effect of composition on the logarithm of the activity coefficient is adequately described by equations from the theory of regular solutions

$$\ln \gamma_1 = 1.79 \, x_2^2; \ln \gamma_2 = 1.70 \, x_1^2$$

The constant coefficient in these equations (1.79) is close to 2. In accordance with theory, this means that $RbClO_3$-$CsClO_3$ solid solutions are close to phase separation. Orig. art. has: 2 figures, 7 tables, and 7 formulas.

Card 2/4

L 63568-65

ACCESSION NR: AP5012973

ASSOCIATION: Institut neorganicheskoy khimii Sibirskogo otdeleniya Akademii nauk SSSR (Institute of Inorganic Chemistry, Siberian Department, Academy of Sciences, SSSR)

SUBMITTED: 04Dec63   ENCL: 01   SUB CODE: IC

NO REF SOV: 001   OTHER: 001

Card 3/4

L.63568-65

ACCESSION NR: AP5012973

Fig. 1. Solubility diagram in the system $RbClO_3$-$CaClO_3$-H_2O (a); $KClO_3$-$RbClO_3$-H_2O (b); $KClO_3$-$CaClO_3$-H_2O (c).

Card 4/4

VULIKH, A.I.; BOGATYREV, V.L.

Specific gravity of ion exchangers as dependent on their ionic composition. Zhur. prikl. khim. 38 no.1:99-102 Ja '65.
(MIRA 18:3)

VULIKH, A.I.; NIKOLAYEV, A.V.; ZAGORSKAYA, M.K.; BOGATYREV, V.L.

Absorption of ammonia and chlorine by ion-exchange resins under
dyhamic conditions. Dokl. AN SSSR 160 no.5;1072-1074 F '65.
(MIRA 18:2)

1. Institut neorganicheskoy khimii Sibirskogo otdeleniya AN SSSR.
2. Chlen-korrespondent AN SSSR (for Nikolayev).

KIRGINTSEV, A.N.; AVVAKUMOV, Ye.G.; VULIKH, A.I.

Behavior of alkali metal impurities in the crystallization of cesium salts from a melt. Dokl. AN SSSR 164 no.6:1315-1318 O '65.

(MIRA 18:10)

1. Institut neorganicheskoy khimii Sibirskogo otdeleniya AN SSSR.
Submitted March 29, 1965.

L 27359-66   ENT(m)/ETC(f)/EWG(m)   RM/DS/JD

ACC NR: AP6008806   SOURCE CODE: UR/0136/65/000/011/0096/0099

AUTHORS: Bogatyrev, V. L.; Vulikh, A. I.; Sokolova, S. I.

43

ORG: none

β

TITLE: Derivation of ammonium perrhenate from potassium perrhenate with the aid of mixed bed ion exchangers

SOURCE: Tsvetnyye metally, no. 11, 1965, 96-99

TOPIC TAGS: ammonium salt, rhenium compound, ion exchange resin, cation exchanger, anion exchanger, ion exchange/ KU-2 cation exchanger, AV-17 anion exchanger

ABSTRACT: This investigation was conducted to extend the work of N. M. Rubinshteyn (Avt. svid. No. 148390 (Byull. izobret., No. 13, 1962)). Ammonium perrhenate was synthesized from potassium perrhenate and ammonium carbonate with the aid of a mixed bed KU-2 cation exchanger and AV-17 anion exchanger. The reaction was carried out according to the scheme

$$RH + R'OH + KReO_4 = RK + R'ReO_4 + H_2O;$$
$$2RH + R_2'CO_3 + 2KReO_4 = 2RK + 2R'ReO_4 + H_2CO_3 (H_2O + CO_2\uparrow);$$
$$RNH_4 + R'OH + KReO_4 = RK + R'ReO_4 + NH_4OH (H_2O + NH_3\uparrow);$$
$$2RNH_4 + R'CO_3 + 2KReO_4 = 2RK + 2R'ReO_4 + (NH_4)_2 CO_3 (H_2O + CO_2\uparrow + NH_3\uparrow).$$

The optimum conditions for maximum yield of ammonium perrhenate were established. The

Card 1/2   UDC: 669.849:66.074.7

L 27359-66

ACC NR: AP6008806

O

experimental results are presented in graphs and tables (see Fig. 1),

Fig. 1. Dependence of the duration of the process on the nature of the compounds formed and the ratio of resin to salt (in mg--eq.); t = 20C, potassium perrhenate charge = 3 g, volume of solution v = 50 ml; 1 - H_2O; 2 - H_2CO_3; 3 - NH_4OH.

and a flow diagram for the reaction is also presented. It was found that 250 g of ammonium carbonate were required per 1000 g yield of ammonium perrhenate. For a mixture of 0.4 kg KU-2 and 0.6 kg AV-17 ion exchangers and at a cycling time of 1.5--2 hours, the yield of ammonium perrhenate was 0.5 kg. The potassium ion content in the product was less than 0.001%. Orig. art. has: 2 tables, 3 graphs, and 1 equation.

SUB CODE: 07/ SUBM DATE: none/ ORIG REF: 004/ OTH REF: 002

Card 2/2

L 34610-66   EWT(1)   RO

ACC NR: AP6026571   SOURCE CODE: UR/0240/66/000/003/0100/0102

AUTHOR: Yulikh, A. I. (Candidate of technical sciences); Shivandronov, Yu. A. (Candidate of technical sciences); Zagorskaya, M. K. (Candidate of technical sciences); Bogatyrev, V. L. (Candidate of chemical sciences)

ORG: Novosibirskiy Factory of Chemical Agents (Novosibirskiy zavod khimicheskikh reaktivov); Institute of Inorganic Chemistry, Siberian Branch, AN SSSR (Institut neorganicheskoy khimii Sibirskogo otdeleniya AN SSSR.

TITLE: Filtering ionite gas mask

SOURCE: Gigiyena i sanitariya, no. 3, 1966, 100-102

TOPIC TAGS:. gas mask, gas absorption, ion exchange resin, gas mask component, gas filter, industrial hygiene

ABSTRACT: The authors tested in a wide range of concentrations and gas velocities the absorption from gas-air mixtures of ammonia, amines (by KU-2 cationite in hydrogen form), sulfur dioxide, chlorine, and hydrogen chloride (by AV-17 and EDE-10P anionites in the hydroxyl and carbonate forms). The basic and acidic gases were invariably completely absorbed. The capacity of the ionites was 80-90% of the total exchange capacity, i.e., 4 meq/g for KU-2 and about 3 meq/g for AB-17. The most universal absorbents are the highly ionized single-function resins (KU-2, OBS-3, SBV, and AV. The carboxyl cationites (e.g., KB-4) and anionites with secondary and tertiary

Card 1/2   UDC: 614.894

L 34610-66

ACC NR: AP6026571

amino groups (e.g., EDE-10P), whose capacity is 8-9 geq/kg, seem to be more effective in absorbing strongly acidic and strongly basic gases. Ionites with large pores (KU-2P for amines, etc.) are best for absorbing gases or fumes of organic substances with large molecules.

The article concludes with a brief description of an ionite gas mask successfully used for several months under industrial conditions to provide protection against ammonia. An antidust filter from a RP-5 respirator is mounted on the lower part of the tank. KU-2 in the H form was the absorbent used. The total weight of the tank with the antidust filter was 200-250 g. Loaded with 50 g of KU-2, it absorbed 3.5 g of ammonia and worked continuously for 30 hours. Orig. art. has: 1 figure and 1 table. [JPRS: 36,455]

SUB CODE: 06, 15, 07 / SUBM DATE: 24Nov64 / ORIG REF: 003 / OTH REF: 001

Card 2/2

L 05025-67   EWT(m)/EWP(t)/ETI   IJP(c)   JD/JG/WB

ACC NR: AP6032980   SOURCE CODE: UR/0078/66/011/010/2328/2330

AUTHOR: Kirgintsev, A. N.; Avvakumov, Ye. G.; Vulikh, A. I.   23

8

ORG: Institute of Inorganic Chemistry, Siberian Branch, AN SSSR (Institut neorganicheskoy khimii, Sibirskoye otdeleniye, AN SSSR)

TITLE: Cesium nitrate purification by zonal recrystallization

SOURCE: Zhurnal neorganicheskoy khimii, v. 11, no. 10, 1966, 2328-2330

TOPIC TAGS: metal crystallization, recrystallization, oriented crystallization, alkali metal, cesium nitrate, zonal recrystallization

ABSTRACT: The method of oriented crystallization is used to determine the distribution of alkali metals in cesium nitrate at different crystallization rates (under constant mixing). The data obtained show that the method of zonal recrystallization may be recommended to free cesium nitrate of alkali metals. Orig. art. has: 1 table and 3 figures. [Authors' abstract]

SUB CODE: 07/   SUBM DATE: 08Jan65/ ORIG REF: 005/

Card 1/1 XC   UDC: 546.36'175:548.53

L 10392-67   EWT(m)   DS/RM

ACC NR: AP7003122   SOURCE CODE: UR/0080/66/039/008/1760/1765

16

AUTHOR: Bogatyrev, V. L.; Vulikh, A. I.; Sokolova, S. I.

ORG: Institute of Inorganic Chemistry, SO, AN SSSR (Institut neorganicheskoy khimii SO AN SSSR)

TITLE: Density of ion-exchange resins

SOURCE: Zhurnal prikladnoy khimii, v. 39, no. 8, 1966, 1760-1765

TOPIC TAGS: ion exchange resin, polymer cross linking

ABSTRACT: A systematic determination was made of the densities of the most widespread industrial cation- and anion-exchange resins in various salt forms (in the dry and swollen states), for use in the development of technological and analytical methods based on the use of ion-exchange resins. The dependence of the density of the investigated ion-exchange resins upon the nature of the sorbed ion, grain size, and degree of cross linking was demonstrated. Fluctuation of the temperature within the range 10-30° was found to have no significant effect upon the results of the determinations. General patterns of variation were observed: 1) the density of the swollen ion-exchange resin was always less than the density of the dry resin, since the density of the latter was greater than one in all cases; 2) the density of the cation-exchange resins was generally greater in absolute magnitude than the density of the anion-exchange resins, which corresponds to the ratio of the densities of their matrices; 3) the density of the same ion-exchange resin increased with increasing equivalent weight of the sorbed ion; 4) the density of various ion-exchange resins containing the same

Card 1/2   UDC: 661.183.12

L 10392-67

ACC NR: AP7003122   O

ion was generally greater the capacity of the ion-exchange resin. The dependence
of the density of the cationite KU-2 upon the atomic weight in the series of
alkali metals was linear, with the density increasing from lithium to cesium.
The influence of degree of cross-linking was investigated on the cation-exchange
resin KU-2, containing 4, 12, and 24% divinylbenzene. No dependence of the —
density on the cross-linking was found for the dry cation-exchange resin, but
a pronounced increase with increasing divinylbenzene content was observed on the
swollen ion-exchange resin. Formulas are cited for the calculation of the optimum
density of the partitioning liquid and time of separation of ions according to
the known densities of the ion-exchange resins. Orig. art. has: 2 figures and
4 tables. [JPRS: 38,970]

SUB CODE: 07 / SUBM DATE: 14Jul64 / ORIG REF: 005 / OTH REF: 002

Card 2/2

ABSTRACT:
     In a recently published article, the authors [association un-
known] analyzed the data from Western and Soviet literature, includ-
ing their own experimental data which were published in 1964-66, on
the thermal synthesis, structure, and properties of A_2BO_3 and ABO_3
compounds, where A is an alkali metal and B is Ti, Zr, Mn, Nb, or
Ta.

     In previous publications, the authors established the effect of
the gaseous medium in which the compounds were synthesized on
their structure and particle size. Now, they have made a detailed
analysis of the earlier data to correlate the conditions of synthesis,

                                                      UDC: 666.3:541.6
Cord 1/5

ACC NR: AP6032947

primarily the gaseous medium, with the physicochemical properties
of the compounds. In the authors' opinion, this analysis is of practi-
cal importance for the synthesis and application of these compounds.
The properties studied were: density, index of refraction, dielectric
constant, intensity of IR absorption bands, and catalytic activity.
The experimental data were obtained with samples sintered at a
relatively low temperature from a solid mixture of an alkali carbon-
ate and an acidic oxide, in vacuum or in a nitrogen stream.

The nature of the gaseous medium was shown to affect only
the structure of alkali metatitanates and manganites (A_2BO_3), and not
their physicochemical properties, such as density, index of refrac-
tion, or dielectric constant. Density was the only property of the
manganites, which was actually measured; the index of refraction
and dielectric constant of the manganites exceeded the measurable
values. An exception was the crystal symmetry of K_2TiO_3 and
$RbTiO_3$ which apparently remained unaffected by the gaseous medium
in which their synthesis was accomplished. However, the existence
in these two compounds of second order phase transitions, undetected
by x-rays, may not be excluded. In all alkali metatitanates the in-
tensity of the IR absorption bands due to deformation vibrations of

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ACC NR: AP6032947

the $[TiO_6]$ octahedra was found to be independent of the method of synthesis. Their catalytic activity was affected by the gaseous medium, as shown, for example, by the comparative data on specific surface, preexponential factor, and activation energy for a maximum decomposition of hydrogen peroxide on a Li_2TiO_3 catalyst prepared in the air or in vacuum.

In the group of A_2BO_3 and ABO_3 compounds, where B is Zr, Nb, or Ta, i.e., alkali metazirconates, metaniobates, and meta-tantalates, only $NaTaO_3$ behaved like the alkali metatitanates and manganites versus the gaseous atmosphere in the synthesis. The gaseous atmosphere changes the crystal structure, i.e., symmetry type and lattice constants of $NaTaO_3$, but does not affect its picno-metric density or intensity of deformation vibrational bands in their IR transmission spectra. Other compounds of this group -- Li_2ZrO_3, $NaNbO_3$, $KNbO_3$, $CsNbO_3$, and $CsTaO_3$ -- change their crystal struc-ture, i.e., symmetry type and/or lattice constant, in different gaseous media simultaneously with certain physicochemical proper-ties, e.g., picnometric density, dielectric constant, intensity of deformation vibrational bands in the IR absorption spectra, and cata-lytic activity versus H_2O_2 decomposition.

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ACC NR: AP6032947

The crystal structure of $LiNbO_3$, $LiTaO_3$, and $KTaO_3$, was not affected by the difference in gaseous atmosphere in the synthesis, but picnometric density, index of refraction, and intensity of deformation vibrational bands of the IR spectra were substantially changed.

These diverse and strong effects of the gaseous medium on the structure and properties of A_2BO_3 and ABO_3 compounds were explained as the result of deformability of their structure, specifically of the tendency toward distortion of the $[TiO_6]$, $[NbO_6]$, and $[TaO_6]$ octahedra. This deformability was correlated with a significant ionic polarizability of the alkali metatitanates, metaniobates, and metatantalates. This correlation which was experimentally established for the above-indicated compounds (presumably) may be extended to other compounds with significant ionic polarizability and may form the base for predicting the possibility of a beneficial effect of a given gaseous medium on the completeness of synthesis of a given compound. In addition, a significant ionic polarizability of a given compound may be an indication of a potential ferroelectric or antiferroelectric property.

An additional indication of the possible ferroelectric or antiferroelectric property of alkali metatitanates was seen in the ob-

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ACC NR: AP6032947

served analogy in the structure of their IR absorption bands which
are linked to the stretching vibrations of the $[TiO_6]$ octahedra and
in the structure of the corresponding bands of the $[NbO_6]$ and $[TaO_6]$
octahedra in the IR abosrption spectra of the alkali metaniobates
and metatantalates. The observed spectral structure is character-
istic of ferroelectric materials. The authors concluded that confir-
mation of the effect of a gaseous medium on solid-phase synthesis
of a given compound is a prerequisite for studying the ferroelectric
property in this compound. Orig. art. has: 1 figure and 8 tables.
/FSB: v. 3, no. 2/

SUB CODE: 11,07,20 / SUBM DATE: 14Jul65 / ORIG REF: 022 / OTH REF: 016

Card 5/5

BOGATYREV, V.L.; VULIKH, A.I.; SOKOLOVA, S.I.

Obtaining ammonium perrhenate from potassium perrhenate with the help of a mixed layer of ionites. TSvet. met. 38 no.11: 96-99 N '65. (MIRA 18:11)

L 10846-66   EWT(m)/ETC/EWG(m) 4   RM/DS

ACC NR: AP6000233   SOURCE CODE: UR/0289/65/000/002/0023/0027

AUTHOR: Nikolayev, A. V.; Bogatyrev, V. L.; Vulikh, A. I.

ORG: Institute of Inorganic Chemistry, Siberian Section, AN SSSR, Novosibirsk
(Institut neorganicheskoy khimii Sibirskogo otdeleniya AN SSSR)

TITLE: Separation of cation and anion exchangers in organic liquids

SOURCE: AN SSSR. Sibirskoye otdeleniye. Izvestiya. Seriya khimicheskikh nauk,
no. 2, 1965, 23-27

TOPIC TAGS: anionite, ion exchange resin

ABSTRACT: The cation exchanger KU-2 was separated from the anion exchanger AV-17 in
mixtures of benzene, dichloroethane, and carbon tetrachloride. Values of the density
and viscosity at 20C in these systems were determined. The dependence of the time of
separation was studied as a function of the density of the separating liquid and
grain size of the exchangers, and the effect of the difference in the density of
the cation and anion exchanger during their separation was demonstrated. Formulas
derived earlier for the calculation of the optimum density of the separating liquid
and duration of separation of cation and anion exchangers were confirmed experiment-
ally. Orig. art. has: 3 figures and 5 tables.

SUB CODE: 07, 11 / SUBM DATE: 15Jun64

Card 1/1   UDC: 541.13

KUTOLIN, S.A.; YULIKH, A.I.

Synthesis of metatitanates of alkaline metals in a vacuum.
Zhur. neorg. khim. 10 no.1:140-144   Ja '65.   (MIRA 18:11)

1. Submitted July 24, 1963.

VULIKH, B.L.

Nekotoryye teoremy o posledovatel'nostyakh razryvnykh funktsiy. DAN, 1 (1935), 357-362. Ob odnom tipe metricheskikh prostranstv. DAN, 4 (1935,) 295-298. Sur les formes géné-rals de certaines opé'rations liné'aires. Matem. sb., 2 (44). (1937) 275-306. K hopmirovannyye prostranstva. L., Uche''n. zap. ped. in-ta, 28 (1939), 179-224.

So: Mathematics in the USSR, 1917-1947
　　　　edited by Kurosh, A.G.,
　　　　Markushovich, A.I.,
　　　　Rashevshiy, P.K.
　Moscow-Leningrad, 1948

VULICH B Z

Vulich, B. Sur les fonctionnelles linéaires dans les espaces semi-ordonnés linéaires. C. R. (Doklady) Acad. Sci. URSS (N.S.) 52, 95–98 (1946).

Let X be a semi-ordered linear space satisfying the axioms (I)–(V) of Kantorovitch [Rec. Math. [Mat. Sbornik] N.S. 2(44), 121–165 (1937)]. Let X contain a unit 1, i.e. inf $(1, x) > 0$ for all $x > 0$. An element e is called a quasi-unit in case inf $(e, 1-e) = 0$. For every positive continuous linear functional f define e_f as the supremum of all quasi-units on which f vanishes. Define $e(f) = 1 - e_f$ and $e^* = \sup e(f)$ as f varies over all positive continuous linear functionals. Let X^* consist of all elements x whose characteristic element $e_x \leq e^*$. It is shown that the conjugate space X^* contains a unit if and only if there exists a linear functional on X essentially positive on all of X^*. A representation theorem for bounded linear functionals on X is also given for the case where X has a unit.

N. Dunford.

Source: Mathematical Reviews Vol 8 No. 8

Vulich, B.

Vulich, B. Sur les opérations linéaires multiplicatives. C. R. (Doklady) Acad. Sci. URSS (N.S.) 52, 183–186 (1946).

An earlier result [same C. R. (N.S.) 41, 142–144 (1943); these Rev. 6, 130] is improved by proving that a continuous linear operation u between two partially ordered spaces X and Y, each with a unit, is multiplicative if and only if, for each quasi-unit e in X, $u(e)$ is a quasi-unit in Y. As a corollary it follows that (with a suitable choice of the unit in Y) a linear continuous operation u is multiplicative providing $u(x_1)$ and $u(x_2)$ are disjoint whenever x_1 and x_2 are disjoint. In the note mentioned above the author represented linear multiplicative operations by means of an abstract integral. In the present note he correlates the continuity properties of the operator with those of the measure function.   *N. Dunford* (New Haven, Conn.).

Source: Mathematical Reviews,   Vol   No.

VULICH, B

Vulich, B. Sur quelques opérations non-linéaires dans les espaces semi-ordonnés linéaires. C. R. (Doklady) Acad. Sci. URSS (N.S.) 52, 475–478 (1946).

This paper concerns the analytical representation of a certain type of nonlinear operator u with domain and range in partially ordered linear vector spaces X, Y with a unit (the spaces X, Y satisfy the axioms I–V of Kantorovitch). The function u is partially additive if $u(x_1 + x_2) = u(x_1) + u(x_2)$ whenever x_1 and x_2 are disjoint; it is disjoint if $u(x_1)$ and $u(x_2)$ are disjoint whenever x_1 and x_2 are. The function u is uniformly continuous if, for every constant C, $\lim_{\delta \to 0} |u(x_1) - u(x_2)|$ is zero in the (o)-topology where $|x_1 - x_2| < \delta \cdot 1$ and $|x_1|, |x_2| < C \cdot 1$. A partially additive disjoint uniformly continuous operator is called an operator (ADC). If in addition the (o)-convergence of x_n to x implies

that of $u(x_n)$ to $u(x)$ then u is an operation $(ADCO)$. A function φ which maps quasi-units in X into quasi-units in Y is called unitary if $\varphi(e_1 + e_2) = \varphi(e_1) + \varphi(e_2)$ for e_1, e_2 disjoint and if the (o)-convergence of e_n to e implies the (o)-convergence of $\varphi(e_n)$ to $\varphi(e)$ it is called a measure function. In terms of these notions it is stated without proof that the general analytical expression for an operation (ADC) ($(ADCO)$, respectively) is given by the Radon integral $u(x) = \int_{-\infty}^{\infty} Y(\lambda) d\varphi(e_\lambda)x$, where $Y(\lambda)$ is uniformly continuous on each finite segment whose values lie in Y, φ is a unitary function (a measure function, respectively) and $Y(0) = 0$. If in addition $Y(\lambda) = \int_0^\lambda Z(t)dt$, where $Z(t)$ is uniformly continuous on each finite segment, then for each x in X the Fréchet differential $d_x u(k)$ of u exists.   *N. Dunford.*

VULIKH, B.Z

Vulih, B. Z. Concrete representations of linear partially ordered spaces. Doklady Akad. Nauk SSSR (N.S.) 58, 733–736 (1947). (Russian)

Let X be a ... satisfying the axioms (I)–(V) of Kantorovich [Rec. Math. [Mat. Sbornik] N.S. 2(44), 121–165 (1937)]. The author indicates a proof of the fact that if X has a unit (i.e., an element 1 such that $\inf(x,1)>0$ for all $x>0$) then it is isomorphic to a "normal" subspace of the space $C_\infty(Q)$ of all "generalized" continuous real functions on a Bicompact Hausdorff space Q. Here a normal subspace is one which contain x with y whenever $|x|<|y|$ and a generalized continuous function is continuous except for being allowed to take on the values $+\infty$ and $-\infty$ in a nowhere dense subset of Q. The proof indicated leans heavily on the related representation theorem of Krein and Kakutani. The author asserts that in general the space $C(Q)$ of all continuous real-valued functions on a bicompact Hausdorff space Q is of type S_1 if and only if Q has 1,∞ property; that the closure of every open subset is open and that if this is the case $C_\infty(Q)$ is of type S_1. He also states a theorem to the effect that every space of type S_1 is imbeddable in a certain ... , it's a space with a unit.

In the second paragraph the author states theorems relating upper bounds and (o)-convergence in the space $C_\infty(Q)$ to the pointwise behavior of the functions concerned. In the third paragraph he indicates how his representation theorem may be used to define multiplication and division in spaces of type S_1. In a final paragraph he states a condition that $C(Q)$ be of type S_1 when Q is the bicompact Hausdorff space associated with a Boolean algebra by Stone's theorem.

G. W. Mackey (Cambridge, Mass.)

VULIKH, B. Z.

Vulih, B. Z. The product in linear partially ordered spaces and its application to the theory of operations. I. Mat. Sbornik N.S. 22(64), 27-78 (1948). (Russian)

Vulih, B. Z. The product in linear partially ordered spaces and its application to the theory of operations. II. Mat. Sbornik N.S. 22(64), 267-317 (1948). (Russian)

The author presents a detailed exposition, with a number of extensions, of results previously announced [C. R. (Doklady) Acad. Sci. URSS (N.S.) 26, 850-854, 855-859 (1940); 41, 142-144, 187-190 (1943); 52, 95-98, 383-386, 475-478 (1946); these Rev. 2, 221, 222; 6, 130, 8, 468; 9, 41]. Close connections exist between the theory expounded here and earlier results obtained by Freudenthal, Kantorovich, M. and S. Krein, and Kakutani [Freudenthal, Akad. Wetensch. Amsterdam, Proc. 39, 641-651 (1936); Kantorovitch, Rec. Math. [Mat. Sbornik] N.S. 2(44), 121-168 (1937); 7(49), 209-284 (1940); M. and S. Krein, Rec. Math. [Mat. Sbornik] N.S. 13(55), 1-38 (1943); Kakutani, Ann. of Math. (2) 42, 523-537, 994-1024 (1941); these Rev. 2, 317; 6, 276; 2, 318; 3, 205]. Let X be a partially ordered linear space over the real numbers (which are denoted by R in the sequel) of type S_1; i.e., (I) for some $x \neq 0$, $0 < x$; (II) $0 < x$ and $0 < y$ imply $0 < x+y$; (III) for every $x \in X$, there exists an $x_1 \in X$ such that $x_1 - x > 0$; (IV) $0 < x$,

$a \in R$, and $0 < a$ imply $0 < ax$; (V) every subset of X bounded above admits a least upper bound. The author first proves a number of relations which obtain in all spaces of type S_1; for example, if A is a bounded set in X and $x \in X$, then $\inf (x, \sup_{a \in A} x) = \sup_{a \in A} \inf (x, a)$.

Next, a further restriction is placed upon the spaces considered. A positive element in X, which may be denoted by the symbol 1, is said to be a unit if $\inf (x, 1) > 0$ for all positive $x \in X$. It is supposed that X contains a unit element and that this unit is fixed once and for all. An element $e \in X$ is said to be unitary if $\inf (e, 1-e) = 0$, and the set of all unitary elements in X is denoted by $\mathfrak{E}(X)$. It is proved that unitary elements behave generally like projection operators in Hilbert space. For every $x \in X$, let e_x (the "characteristic" of x) be the least element in $\mathfrak{E}(X)$ with the property that $\inf (|x|, 1-e) = 0$; it is shown that e_x exists for all $x \in X$ and that $e_x = \sup_n \inf (n|x|, 1)$. Various other formal properties of e_x are also established.

Next, for all $x \geq 0$, let $S(x)$ be the set of all sums $\sum_{i=1}^n a_i e_i$, where the a_i are nonnegative real numbers, $e_i \in \mathfrak{E}(X)$, and the entire sum is less than or equal to x. For x, y in X and nonnegative, consider the set B of all sums $\sum_{i=1}^n a_i \beta_i \inf (e_i, e_i)$, where $\sum_{i=1}^n a_i e_i \in S(x)$ and $\sum_{i=1}^n \beta_i e_i \in S(y)$. If B is bounded above, the element $\sup_{z \in B} z$ is defined to be the product xy of the elements x and y. If B is unbounded, then the product xy

Source: Mathematical Reviews, 1/4 Vol 10, No. 1

V B2

does not exist. For x and y nonpositive, the product xy is defined as sup $(x, 0) \cdot$ sup $(y, 0) + (-1)$ inf $(x, 0) \cdot (-1)$ inf $(y, 0)$ — sup $(x, 0) \cdot (-1)$ inf $(y, 0) - (-1)$ inf $(x, 0) \cdot$ sup $(y, 0)$, if all four products exist; otherwise xy does not exist. It is proved that $xy = yx$ if either xy or yx exists; that $x(y+z) = xy + xz$ if xy and xz exist; that $x \cdot 1 = x$ and $x \cdot 0 = 0$; that $(xy)z = x(yz)$ if xy, yz, and $(xy)z$ exist, that $xy = 0$ if and only if inf $(|x|, |y|) = 0$.

The author next considers the existence of inverse elements, as follows. If for an $x \in X$, there exists $y \in X$ such that $e_x = e_y = xy$ exists, and $xy = e_x$, then y is said to be inverse to x and is denoted by x^{-1}. It is immediate that $e = e_x$ for all $x \in X$ (in particular, $(-1) = 0$) and that $(x^{-1})^{-1} = x$. A number of the usual formal properties of inverses in commutative rings are established, and it is shown that the product is a continuous function of both variables in the topology of o-convergence.

The next topic treated is that of spaces X which are rings under the operations $x+y$ and xy. An element $x \in X$ is said to be bounded if $|x| \leq C \cdot l$ for some $C \in R$; the set of all such x's for a given nonnegative C is called a segment in X, and the set of all segments is denoted by X. Then X is clearly a space of type S_x; it is a ring; and it admits the norm $\|x\| = \inf [C(C \in R, |x| \leq C \cdot l)]$. Then the results obtained

Source: Mathematical Reviews, 7/4, Vol 10, No. 1

by a number of authors [see, for example, I. M. Gelfand, [Mat. Sbornik] N.S. 9(51); 3–26 (1941): these [?]. X is identifiable with a ring of real-valued continuous functions defined on a certain compact Hausdorff space Y. [Reviewer's note: X is identifiable with the set of all real-valued continuous functions defined on Y if and only if it is complete in its norm; and if this is the case, Y must enjoy a very strong disconnectivity property, in view of axiom V satisfied by X. See also B. Z. Vulih, Doklady Akad. Nauk SSSR (N.S.) 68, 733–736 (1947); these Rev. v. 9, 290.] It is also proved that any space X can be imbedded in a ring X, by means of a construction due to Pinsker [C. R. (Doklady) Acad. Sci. URSS (N.S.) 21, 6–9 (1938); 22, 216–219 (1939)]. The author remarks also that every space of type S_x can be identified with a space of real-valued continuous functions on a compact Hausdorff space X; this fact makes the introduction of multiplication in X trivial. [Reviewer's note: very similar considerations apply, of course, to Banach spaces satisfying Kakutani's axioms for an M-space [loc. cit.]. Much of the interest of the present paper lies in the fact that multiplication is defined without recourse to a representation theory.]

A number of applications of the constructions outlined above are discussed; e.g., to L_p, l_p, and the space of all countable infinite sequences of real numbers. In each case,

the product therein not to be the multiple parent ... surface, and the inverse x^{-1} is the element which is 0 wherever $x = 0$ and is $1/x$ wherever $x \neq 0$. The product and inverse are defined only where these constructions yield elements of the original space.

A final section of part I deals with the calculation of positive linear functionals in spaces X of type S, which satisfy a certain countability restriction. Here it is remarked that the conjugate space $\overline{X}$ of X is of type S, and that, if X contains a unit element Π, then every continuous positive linear functional $u(x)$ on X can be written in the form $\Pi(xy)$, where y lies in a certain subspace of X. Using this result, the author exhibits the general continuous linear functionals on L_p and l_p. [See S. Banach, Théorie des Opérations Linéaires, Warszawa, 1932, pp. 61 et seq.] It is shown also that X can be identified with a certain subset of $\overline{X}$ only when X is a space admitting an inner product.

Part II of the paper deals with mappings u of a space X into a space Y (where X and Y are both of type S, and both contain unit elements) such that Inf $(|x|, |y|) = 0$ implies that Inf $(|u(x)|, |u(y)|) = 0$. Such operations are called disjunctive. Most operations considered are in addition additive and continuous either in the o-topology or i-topology. The first section deals with general properties of these operations. It is shown that a continuous operation ...

... is detail. It is proved that an additive, multiplicative, o-continuous mapping of X into itself has the form x^a ... Other general properties of multiplicative operations are discussed, among them being the theorem that a one-one continuous additive and multiplicative operation admits an inverse having all of these properties.

It is next proved that all o-continuous additive and multiplicative operations u mapping M (the space of all bounded measurable functions on $[a, b]$) into itself have a particularly simple form, namely, $u(x) = x(f(t))$ for $t \in E$; $u(x) = 0$ for $t \in$ non-E, where E is a measurable subset of $[a, b]$ and f a measurable function mapping $[a, b]$ into itself, with the property that the inverse image of a set of measure 0 has measure 0. A similar result is proved for mappings of L into itself.

The author then exhibits a theory of the Radon integral spaces X of type S, having a unit element. A spectral resolution for $x \in X$ is first defined. $E(x \in R)$ is the characteristic element for inf $(x - \lambda 1, 0)$. Let ϕ be a function defined on $E(X)$ and with values in $E(Y)$, where Y is another space of type S with unit element. For $c_1, c_2 \in E(X)$ and inf $(c_1, c_2) = 0$ suppose that $\phi(c_1 + c_2) = \phi(c_1) + \phi(c_2)$. Let y be a function with domain included in R and range included in Y. The integral $\int x d\phi(t)$ is defined as the o-limit of sums ...

Vulih, B. Z.

4

proved that any σ-continuous multiplicative additive operation mapping X into Y has a representation as an integral of this kind and conversely. A similar representation using more general functions $\psi(\lambda)$, is produced for operations u mapping X into Y. Such an operation $u(x)$ has the form $\int_{-\infty}^{\infty} \psi(\lambda) d\varepsilon_x$ if it is additive for disjoint elements, is continuous in a certain strong sense, and is disjunctive. The author closes with the extension of a theory of approximation to operations of general type by means of a continuous additive and multiplicative operations, which reduces to the classical Weierstrass approximation theorem for the case $X = Y = R$.

It would be useful, in the reviewer's opinion, to investigate the theory when axiom V is relaxed in various ways, since this axiom is so stringent that it rules out many of the commonest partially ordered linear spaces.

E. Hewitt (Seattle, Wash.).

Source: Mathematical Reviews, Vol 14. No. 1

VULIKH, B. Z. NOVOE
25337

Dokazatelstvo Odnoy Teoremy Kreynor.   Uchen Zapiski (Dnipr. Gos. Ped.
In-T IM Gertsena) T. LXIV, 1948, S. 9-15

SO: LETOPIS NO. 30, 1948

VULIKH, B. Z.

Kantorovič, L. V., Vulih, B. Z., and Pinsker, A. G. Funkcional'nyĭ analiz v poluuporjadočennyh prostranstvah. [Functional Analysis in Partially Ordered Spaces.] Gosudarstv. Izdat. Tehn.-Teor. Lit. Moscow-Leningrad, 1950, 548 pp.

The volume under review contains an encyclopedic discussion of the theory of partially ordered linear spaces, as developed by Freudenthal [Akad. Wetensch. Amsterdam, Proc. 39:641–651 (1936)], Kantorovič [e.g., C. R. (Doklady) Acad. Sci. URSS (N.S.) 12 (1936 III), 9–14; Rec. Math. [Mat. Sbornik] N.S. 2(44), 121–165 (1937)], and many other writers. [For a basic list of original memoirs, cf. G. Birkhoff, Lattice Theory, Amer. Math. Soc. Colloquium Publ., v. 25, 2d ed., New York, 1948; these Rev. 10, 673.] The work is divided into an introduction, thirteen chapters, and two appendices. In the introduction there is an extended historical sketch in which the work of non-Soviet mathematicians in the field of functional analysis is covered in several lines. The scientific portion of the book has as its basic object the study of complete vector lattices. Such spaces are here referred to as K-spaces [poluuporjadočennye...]

...change their axioms whenever convenient, and succeed in defining, in the course of the exposition, no fewer than twenty different types of vector lattices. Chapter 1 deals with the elementary properties of K-spaces. Greater/number of identities involving "∨", "∧", "+", "−", and "| |", are proved; convergence and ∗convergence, here referred to as ∘-convergence, are defined and discussed and a few standard examples of K-spaces are produced. In chapter II, certain special subspaces of K-spaces, called components, are introduced. A linear subspace L of K-space X is called a component if x∈X, y∈X, and |z|≤|y| imply y∈L, and if L is... bounded above in X. It is shown that every K-space X is here considerably extended. A theorem of G. Birkhoff [Proc. Nat. Acad. Sci. 11:2, A 34, 155–159 (1938)], to the effect that the set of all components of a K-space is a complete Boolean algebra, is also proved. In chapter IV, we find results, in part new, concerning extensions of K-spaces. It is next shown that any complete Boolean algebra is the Boolean algebra of components of a K-space. This is done by a construction introduced by Kakutani [Ann. of Math. (2) 42, 523–537 (1941); these Rev. 2, 315]. Next it is shown that every K-space can be imbedded in another K-space having a certain strong completeness property. It is also shown that every such complete K-space admits a natural definition of multiplication for every pair of ele-

...to a certain sense a subdirect sum of pair-wise lattice dis-joint components. Chapter III presents Freudenthal's result [loc. cit.] on integral representation of elements of K-spaces.

Source: Mathematical Reviews.

Vol. 18, No. 5.

means, making it a commutative and associative algebra over the real field. Chapters V and VI treat K-spaces in which various additional notions are supposed satisfied, such as the existence of a metric, a norm, etc. Chapter VII deals with additive homogeneous operators carrying a given K-space into another. Four types of continuity are defined and would, in great detail; and as one would expect, the set of ... space ... is ... representation is shown to be a ... Chapter VIII presents representation theorems for various additive, homogeneous, and continuous opera-tors. The unaltered representations for linear functionals on spaces of continuous real functions, L, l, L_p, l_p, etc. are shown to have their abstract analogues. A large number of special examples are worked out. Chapter IX begins with ... obvious analogue of the Hahn-Banach theorem for ... mappings of any linear space into a K-space, and proceeds to a long collection of theorems dealing with extensibility of operators of various kinds. The Daniell construction of the Lebesgue integral appears as a very special case of one of these extension theorems, a noteworthy fact is that Lebesgue's theorems on term-by-term integration are already contained in the general theorem employed. The classical moment problems for ... bounded intervals are also ... various prop... The case of functions vanishing outside of bounded sets from the Riemann integral for continuous functions appear ... ... ters XI, XII and XII deal with con... ... of sequences of additive, homogeneous, and continuous operators, with operators continuous in a certain strong sense, and with application of these results to integral and differential

VULIKH, B. Z.

Kantorovič, L. V., Vulih, B. Z, and Pinsker, A. G. Partially ordered groups and linear partially ordered spaces. Uspehi Matem. Nauk (N.S.) 6, no. 3 (43), 31-98 (1951). (Russian)

This paper is a survey of the present status of the theory of lattice-ordered groups and linear spaces, with special emphasis on those in which the lattice ordering is complete. Most of the material considered is also found in the authors' Funkcional'nyi analiz v poluuporyadočennyh prostranstvah [Gosudarstv. Izdat. Tehn.-Teor. Lit. Moscow-Leningrad, 1950; these Rev. 12, 340]. An extensive and truly recent and accurate historical references are given. E. Hewitt.

Source: Mathematical Reviews,   Vol. 13 No. 4

VULIKH, B. Z.

222745

USSR/Mathematics - Modern Algebra,   11 May 51
Lineals

"Concrete Representation of Semiordered Lineals,"
B. Z. Vulikh

"Dok Ak Nauk SSSR" Vol LXXVIII, No 2, pp 189-192

In the theory of linear semiordered spaces (K-spaces) the possibility has been established of realizing such spaces by means of real continuous functions. A similar realization is established here for the more general linear semiordered sets, namely, K-lineals. The main difference

222745

between K-lineal and K-space is that we do not assume the existence of facet (margin) in each bounded set. Submitted by Acad V. I. Smirnov 12 Mar 51.

VULIKH, B. Z.

USSR/Mathematics - Topological Spaces   Jan/Feb 52

"Concerning the Extension of Continuous Functions in Topological Spaces," B. Z. Vulikh, Leningrad

"Matemat Sbor" Vol XXX (72), No 1, pp 167-170

Demonstrates the following theorem relating to topological spaces: Let S be a topological space; A in S is complete set in S; in order that every real function given and continuous in A can be extended with preservation of continuity to the entire space S, it is necessary and sufficient

203T49

USSR/Mathematics - Topological Spaces   Jan/Feb 52
(Contd)

that any 2 sets A_1 and A_2 contained in A and functionally sep in A possess disjunctive closures in S. (f. E. Hewitt, "Rings or Real-Valued Continuous Functions," Trans Amer Math Soc, 64, 1948, 45-99. Submitted 28 Jun 51.

203T49

VULIKH, B. Z.

USSR/Mathematics - Modern Algebra,   Jul/Aug 53
Ordered Sets

"Certain Problems in the Theory of Linear Semi-Ordered Sets," B. Z. Vulikh

Iz Ak Nauk SSSR, Ser Mat, Vol 17, No 4, pp 365-388

Discusses a number of problems touching on the structures of linear semi-ordered sets. Bases his method of investigation on the representation of linear semi-ordered sets by means of continuous functions in a bicompactum. Presented by Acad V. I. Smirnov, 16 Jun 52.

274T66

VULIKH, B.Z. (Leningrad).

Generalized partially ordered rings. Mat.sbor. 33 no.2:343-358 S-O '53.
(MLRA 6:9)
(Algebra, Universal)

VULIKH, B.Z.

Characteristic properties of a product in linear semiordered spaces.
Uch., zap. Ped. inst. Gerts. 89:3-8 '53.   (MIRA 11:3)
(Functional analysis)

VULIKH, B.Z.

Imbedding of a normed semiordered space in the second conjugate space. Usp.mat.nauk 9 no.1:91-99 Ja-F '54. (MLRA 7:2)

(Topology)

Vulikh, B. Z.

Transactions of the Third All-union Mathematical Congress + (Cont.) Moscow,
Jun-Jul '56, Trudy '56 V. 1, Sect. Rpts., Izdatel'stvo AN SSSR, Moscow, 1956, 237 pp.
Vulikh, B. Z. (Leningrad).   Semiordered Rings.   20-21

Mention is made of Domrachev, G. I.

There are 2 references, both of them USSR.

Gavrilov, L. I. (Leningrad).   K-continued Polynomials.   21

There is 1 USSR reference   21

Grantmakher, F. R. (Moscow).   On Structural Lattice
Stability of the Sum of Two Polynomials.   21

Gurevich, G. B. (Moscow).   Algebra of a Group of Automorphisms
of an Arbitrary Standard Zero-algebra.   21-22

There are 2 references, both of them USSR.

Zavalo, S. T. (Cherkassy).   Operator Free Groups.   22-23
Card 8/80
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VULIKH, B.Z.

Boolean dimension. Uch. zap. Ped. inst. Gerts. 125:
95-114 '56.   (MLRA 9:12)

(Algebra, Abstract)

$Vu Li K H, B.Z$

SUBJECT	USSR/MATHEMATICS/Functional analysis CARD 1/1 PG - 750
AUTHOR	VULIGH B.Z.
TITLE	The application of the theory of partially ordered spaces to the investigation of selfadjoint operators in the Hilbert space.
PERIODICAL	Uspechi mat.Nauk 12, 1, 169-172 (1957)
	reviewed 5/1957

The great analogy of the proofs and results of the theory of partially ordered spaces (lattice theory) and the theory of selfadjoint operators induces the author to apply directly the theory of partially ordered spaces to the investigation of the selfadjoint operators. Without proof beside of some own results the author enumerates several well-known results of Stone, Sobolev, Ljubowin etc. Most of the results relate to bounded operators.

VULIKH, Boris Zakharovich

VULIKH, B.Z.

Partial order in rings of bounded self-conjugate operators [with
summary in English]. Vest.LGU 12 no.13:13-21 '57. (MIRA 10:11)
(Operators (Mathematics))

PHASE I BOOK EXPLOITATION   656

Vulikh, Boris Zakharovich

Vvedeniye v funktsional'nyy analiz (Introduction to Functional Analysis) Moscow,
   Gos. izd-vo fiziko-matematicheskoy lit-ry, 1958.   352 p. 7,500 copies printed.

Ed.: Akilov, G. P.; Tech. Ed.: Volchok, K. M.

PURPOSE: This book is intended for those interested in the fundamentals of functional
   analysis who do not have previous training in the more specialized branches of math-
   ematics, and it may also be useful to engineers.

COVERAGE: The author gives only the fundamentals of functional analysis and their
   applications to problems in various fields of mathematics. Therefore the basic con-
   cepts of Euclidean, metric, normed, Hilbert and L^2 spaces are given. A short
   theory of operators in various spaces, as well as their properties, are presented.
   As particular applications of functional analysis, the basic theorems of integ-
   ral equations are presented. Various problems are studied, such as the problem of
   the best approximation, boundary value problem of differential equations, approxi-
   mate methods of the solution of equations, generalized methods of the summability

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Introduction to Functional Analysis   656

of series and others. There are 11 Soviet references including 2 translations.
No personalities are mentioned.

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AVAILABLE: Library of Congress (QA320.V8)

IK/gmp
10-31-58

Card 10/10

YEGOROVA, Irina Aleksandrovna; VULIKH, B.Z., prof., red.;
DOLGOPOLOV, V.G., red.

[Problems and exercises in mathematical analysis] Zadechnik-
praktikum po matematicheskomu analizu. Moskva, Uchpedgiz.
Pt.3. [Functions of several variables. Funktsii neskol'kikh
peremennykh. Izd.2. 1962. 102 p.   (MIRA 17:8)

VULIKH, Boris Zakharovich; BAYEVA, A.P., red.

    [Short course in the theory of functions of real variables]
    Kratkii kurs teorii funktsii veshchestvennoi peremennoi.
    Moskva, Nauka, 1965. 304 p.   (MIRA 18:8)

VULIKH, B.Z.; GAVURIN, M.K.; LOZINSKIY, S.M.

Isidor Pavlovich Natanson, 1906-1964; obituary. Usp. mat. nauk
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BOKHAN, Konstantin Aleksandrovich; VULIKH, B.Z., prof., red.;
RYVKIN, A.Z., red.; DOLGOPOLOV, V.G., red.

[Problems and exercises in mathematical analysis] Za-
dachnik-praktikum po matematicheskomu analizu. Moskva,
Uchpedgiz. Pt.1.[Introduction to analysis; differential
calculus of functions of a single variable] Vvedenie v
analiz; differentsial'noe ischislenie funktsii odnoi pe-
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VULIKH, B.Z.

Linear structures equivalent to structures with a monotone
norm. Dokl. AN SSSR 147 no.2:271-274 N '62.   (MIRA 15:11)

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teoriiu poluuporiadochennykh prostranstv. Moskva, Gos.izd-vo
fiziko-matem.lit-ry, 1961. 407 p.   (MIRA 14:6)
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KOLBINA, L.I.; LOZINSKIY, S.M.; LADYZHENSKAYA, O.A.; LINNIK, Yu.V.;
LEBEDEV, N.A.; MIKHLIN, S.G.; MAKAROV, B.M.; NATANSON, I.P.;
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SAFRONOVA, G.P.; SMOLITSKIY, Kh.L.; FADDEYEV, D.K.

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MELEKHINA, V.P.; PINIGIN, M.A.; Prinimali uchastiye: KHRUSTALEVA, V.A.;
    SELINA, I.A.; VULIKH,S.L.; PANOVA, M.K.; LUZHNOVA,M.A.; BUNIM,T.N.

Materials for evaluating the pollution of air by wastes in the
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zap. Mosk. nauch.-issl. inst. san. i gig. no.9:25-29 '61.
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1. Moskovskiy nauchno-issledovatel'skiy institut gigiyeny
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doktor khimicheskikh nauk, retsenzent; OKHREMENKO, N.S., kandidat
sel'skokhozyaystvennykh nauk, retsenzent; MARCHENKO, O.S., kandidat
sel'skokhozyaystvennykh nauk, retsenzent; ZHURAVLEVA, Ye.I.,
kandidat tekhnicheskikh nauk, spetsredaktor; KHMEL'NITSKAYA, A.Z.,
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VALIKHANA. A.

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conveying machines." Reviewed by I.Sh. Vulikhman. Stroi. i dor.
machinostr. 3 no.11:40 N '58.   (MIRA 11:11)
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